

## SEQUENCE LISTING

<110> National Institute of Agrobiological Sciences

<120> Sodium/Proton antiporter gene

<130> MOA-006PCT

<150> JP 1998-365604

<151> 1998-12-22

<160> 2

<170> PatentIn Ver. 2.0

<210> 1

<211> 2330

<212> DNA

<213> Oryza sativa

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<222> (297)..(1901)

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tctgcgaatc gaattctttg ttttttttc tctaatttta ccgggaattg tcgaattagg 180

cattcaccaa cgagcaagag gggagtggat tggttggta aagctccgca tcttgcggcg 240

gaaatctcgc tctcttctct gcggtgggtg gccggagaag tcgccgccgg tgaggc atg 299

Met

1

ggg atg gag gtg gcg gcg gcg cgg ctg ggg gct ctg tac acg acc tcc 347

Gly Met Glu Val Ala Ala Ala Arg Leu Gly Ala Leu Tyr Thr Thr Ser

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15

gac tac gcg tcg gtg gtg tcc atc aac ctg ttc gtc gcg ctg ctc tgc 395

Asp Tyr Ala Ser Val Val Ser Ile Asn Leu Phe Val Ala Leu Leu Cys

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gcc tgc atc gtc ctc ggc cac ctc ctc gag gag aat cgc tgg gtc aat 443

Ala Cys Ile Val Leu Gly His Leu Leu Glu Glu Asn Arg Trp Val Asn

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40

45

gag tcc atc acc gcg ctc atc atc ggg ctc tgc acc ggc gtg gtg atc 491

Glu Ser Ile Thr Ala Leu Ile Ile Gly Leu Cys Thr Gly Val Val Ile

|   |     |     |     |  |
|---|-----|-----|-----|--|
| 50  | 55  | 60  | 65  |  |
| tig ctg atg acc aaa ggg aag agc tcg cac tta ttc gtc ttc agt gag | 539 |     |     |  |
| Leu Leu Met Thr Lys Gly Lys Ser Ser His Leu Phe Val Phe Ser Glu |     |     |     |  |
| 70  | 75  | 80  |     |  |
| gat ctc ttc ttc atc tac ctc ctc cct ccg atc atc ttc aat gca ggt | 587 |     |     |  |
| Asp Leu Phe Phe Ile Tyr Leu Leu Pro Pro Ile Ile Phe Asn Ala Gly |     |     |     |  |
| 85  | 90  | 95  |     |  |
| ttt cag gta aag aaa aag caa ttc ttc cgg aat ttc atg acg atc aca | 635 |     |     |  |
| Phe Gln Val Lys Lys Lys Gln Phe Phe Arg Asn Phe Met Thr Ile Thr |     |     |     |  |
| 100   | 105 | 110 |     |  |
| tta ttt gga gcc gtc ggg aca atg ata tcc ttt ttc aca ata tct att | 683 |     |     |  |
| Leu Phe Gly Ala Val Gly Thr Met Ile Ser Phe Phe Thr Ile Ser Ile |     |     |     |  |
| 115   | 120 | 125 |     |  |
| gct gcc att gca ata ttc agc aga atg aac att gga acg ctg gat gta | 731 |     |     |  |
| Ala Ala Ile Ala Ile Phe Ser Arg Met Asn Ile Gly Thr Leu Asp Val |     |     |     |  |
| 130   | 135 | 140 | 145 |  |
| gga gat ttt ctt gca att gga gcc atc ttt tct gcg aca gat tct gtc | 779 |     |     |  |
| Gly Asp Phe Leu Ala Ile Gly Ala Ile Phe Ser Ala Thr Asp Ser Val |     |     |     |  |
| 150   | 155 | 160 |     |  |

tgc aca ttg cag gtc ctc aat cag gat gag aca ccc ttt ttg tac agt 827  
 Cys Thr Leu Gln Val Leu Asn Gln Asp Glu Thr Pro Phe Leu Tyr Ser  
 165 170 175

ctg gta ttc ggt gaa ggt gtt gtg aac gat gct aca tca att gtg ctt 875  
 Leu Val Phe Gly Glu Gly Val Val Asn Asp Ala Thr Ser Ile Val Leu  
 180 185 190

ttc aac gca cta cag aac ttt gat ctt gtc cac ata gat gcg gct gtc 923  
 Phe Asn Ala Leu Gln Asn Phe Asp Leu Val His Ile Asp Ala Ala Val  
 195 200 205

gtt ctg aaa ttc ttg ggg aac ttc ttt tat tta ttt ttg tcg agc acc 971  
 Val Leu Lys Phe Leu Gly Asn Phe Phe Tyr Leu Phe Leu Ser Ser Thr  
 210 215 220 225

ttc ctt gga gta ttt gct gga ttg ctc agt gca tac ata atc aag aag 1019  
 Phe Leu Gly Val Phe Ala Gly Leu Leu Ser Ala Tyr Ile Ile Lys Lys  
 230 235 240

cta tac att gga agg cat tct act gac cgt gag gtt gcc ctt atg atg 1067  
 Leu Tyr Ile Gly Arg His Ser Thr Asp Arg Glu Val Ala Leu Met Met  
 245 250 255

ctc atg gct tac ctt tca tat atg ctg gct gag ttg cta gat ttg agc 1115  
 Leu Met Ala Tyr Leu Ser Tyr Met Leu Ala Glu Leu Leu Asp Leu Ser

|  |     |     |     |
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| 260  | 265 | 270 |     |
| ggc att ctc acc gta ttc ttc tgt ggt att gta atg tca cat tac act 1163 |     |     |     |
| Gly Ile Leu Thr Val Phe Phe Cys Gly Ile Val Met Ser His Tyr Thr      |     |     |     |
| 275  | 280 | 285 |     |
| tgg cat aac gtc aca gag agt tca aga gtt aca aca aag cac gca ttt 1211 |     |     |     |
| Trp His Asn Val Thr Glu Ser Ser Arg Val Thr Thr Lys His Ala Phe      |     |     |     |
| 290  | 295 | 300 | 305 |
| gca act ctg tcc ttc att gct gag act ttt ctc ttc ctg tat gtt ggg 1259 |     |     |     |
| Ala Thr Leu Ser Phe Ile Ala Glu Thr Phe Leu Phe Leu Tyr Val Gly      |     |     |     |
|  | 310 | 315 | 320 |
| atg gat gca ttg gat att gaa aaa tgg gag ttt gcc agt gac aga cct 1307 |     |     |     |
| Met Asp Ala Leu Asp Ile Glu Lys Trp Glu Phe Ala Ser Asp Arg Pro      |     |     |     |
| 325  | 330 | 335 |     |
| ggc aaa tcc att ggg ata agc tca att ttg cta gga ttg gtt ctg att 1355 |     |     |     |
| Gly Lys Ser Ile Gly Ile Ser Ser Ile Leu Leu Gly Leu Val Leu Ile      |     |     |     |
| 340  | 345 | 350 |     |
| gga aga gct gct ttt gta ttc ccg ctg tgg ttc ttg tgg aac cta aca 1403 |     |     |     |
| Gly Arg Ala Ala Phe Val Phe Pro Leu Ser Phe Leu Ser Asn Leu Thr      |     |     |     |
| 355  | 360 | 365 |     |

aag aag gca ccg aat gaa aaa ata acc tgg aga cag caa gtt gta ata 1451

Lys Lys Ala Pro Asn Glu Lys Ile Thr Trp Arg Gln Gln Val Val Ile

370 375 380 385

tgg tgg gct ggg ctg atg aga gga gct gtg tgg att gct ctt gct tac 1499

Trp Trp Ala Gly Leu Met Arg Gly Ala Val Ser Ile Ala Leu Ala Tyr

390 395 400

aat aag ttt aca aga tct ggc cat act cag ctg cac ggc aat gca ata 1547

Asn Lys Phe Thr Arg Ser Gly His Thr Gln Leu His Gly Asn Ala Ile

405 410 415

atg atc acc agc acc atc act gtc gtt ctt ttt agc act atg gta ttt 1595

Met Ile Thr Ser Thr Ile Thr Val Val Leu Phe Ser Thr Met Val Phe

420 425 430

ggg atg atg aca aag cca ttg atc agg ctg ctg cta ccg gcc tca ggc 1643

Gly Met Met Thr Lys Pro Leu Ile Arg Leu Leu Leu Pro Ala Ser Gly

435 440 445

cat cct gtc acc tct gag cct tca tca cca aag tcc ctg cat tct cct 1691

His Pro Val Thr Ser Glu Pro Ser Ser Pro Lys Ser Leu His Ser Pro

450 455 460 465

ctc ctg aca agc atg caa ggt tct gac ctc gag agt aca acc aac att 1739

Leu Leu Thr Ser Met Gln Gly Ser Asp Leu Glu Ser Thr Thr Asn Ile

470

475

480

glg agg cct tcc agc ctc cgg atg ctc ctc acc aag ccg acc cac act 1787

Val Arg Pro Ser Ser Leu Arg Met Leu Leu Thr Lys Pro Thr His Thr

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gtc cac tac tac tgg cgc aag ttc gac gac gcg ctg atg cga ccg atg 1835

Val His Tyr Tyr Trp Arg Lys Phe Asp Asp Ala Leu Met Arg Pro Met

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ttt ggc ggg cgc ggg ttc glg ccc ttc tcc cct gga tca cca acc gag 1883

Phe Gly Gly Arg Gly Phe Val Pro Phe Ser Pro Gly Ser Pro Thr Glu

515

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cag agc cat gga gga aga tgaacagtc aaagaaatga gaalggaaig 1931

Gln Ser His Gly Gly Arg

530

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gttgatgagg agaatacatg taaaatgtga cagcaaaaga gagaaggcaa gttttgggtt 1991

tgtagagttt ggctgctgct aatgagttgt tgatagtgcc tatattcttc agaacttcag 2051

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<213> Oryza sativa

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30

Cys Ala Cys Ile Val Leu Gly His Leu Leu Glu Glu Asn Arg Trp Val

35

40

45

Asn Glu Ser Ile Thr Ala Leu Ile Ile Gly Leu Cys Thr Gly Val Val

50

55

60

Ile Leu Leu Met Thr Lys Gly Lys Ser Ser His Leu Phe Val Phe Ser



65                                      70                                      75                                      80

Glu Asp Leu Phe Phe Ile Tyr Leu Leu Pro Pro Ile Ile Phe Asn Ala

85                                      90                                      95

Gly Phe Gln Val Lys Lys Lys Gln Phe Phe Arg Asn Phe Met Thr Ile

100                                      105                                      110

Thr Leu Phe Gly Ala Val Gly Thr Met Ile Ser Phe Phe Thr Ile Ser

115                                      120                                      125

Ile Ala Ala Ile Ala Ile Phe Ser Arg Met Asn Ile Gly Thr Leu Asp

130                                      135                                      140

Val Gly Asp Phe Leu Ala Ile Gly Ala Ile Phe Ser Ala Thr Asp Ser

145                                      150                                      155                                      160

Val Cys Thr Leu Gln Val Leu Asn Gln Asp Glu Thr Pro Phe Leu Tyr

165                                      170                                      175

Ser Leu Val Phe Gly Glu Gly Val Val Asn Asp Ala Thr Ser Ile Val

180                                      185                                      190

Leu Phe Asn Ala Leu Gln Asn Phe Asp Leu Val His Ile Asp Ala Ala

195                                      200                                      205

Val Val Leu Lys Phe Leu Gly Asn Phe Phe Tyr Leu Phe Leu Ser Ser

210

215

220

Thr Phe Leu Gly Val Phe Ala Gly Leu Leu Ser Ala Tyr Ile Ile Lys

225

230

235

240

Lys Leu Tyr Ile Gly Arg His Ser Thr Asp Arg Glu Val Ala Leu Met

245

250

255

Met Leu Met Ala Tyr Leu Ser Tyr Met Leu Ala Glu Leu Leu Asp Leu

260

265

270

Ser Gly Ile Leu Thr Val Phe Phe Cys Gly Ile Val Met Ser His Tyr

275

280

285

Thr Trp His Asn Val Thr Glu Ser Ser Arg Val Thr Thr Lys His Ala

290

295

300

Phe Ala Thr Leu Ser Phe Ile Ala Glu Thr Phe Leu Phe Leu Tyr Val

305

310

315

320

Gly Met Asp Ala Leu Asp Ile Glu Lys Trp Glu Phe Ala Ser Asp Arg

325

330

335

Pro Gly Lys Ser Ile Gly Ile Ser Ser Ile Leu Leu Gly Leu Val Leu

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345

350

Ile Gly Arg Ala Ala Phe Val Phe Pro Leu Ser Phe Leu Ser Asn Leu

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Thr Lys Lys Ala Pro Asn Glu Lys Ile Thr Trp Arg Gln Gln Val Val

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380

Ile Trp Trp Ala Gly Leu Met Arg Gly Ala Val Ser Ile Ala Leu Ala

385

390

395

400

Tyr Asn Lys Phe Thr Arg Ser Gly His Thr Gln Leu His Gly Asn Ala

405

410

415

Ile Met Ile Thr Ser Thr Ile Thr Val Val Leu Phe Ser Thr Met Val

420

425

430

Phe Gly Met Met Thr Lys Pro Leu Ile Arg Leu Leu Leu Pro Ala Ser

435

440

445

Gly His Pro Val Thr Ser Glu Pro Ser Ser Pro Lys Ser Leu His Ser

450

455

460

Pro Leu Leu Thr Ser Met Gln Gly Ser Asp Leu Glu Ser Thr Thr Asn

465

470

475

480

Ile Val Arg Pro Ser Ser Leu Arg Met Leu Leu Thr Lys Pro Thr His

485

490

495

Thr Val His Tyr Tyr Trp Arg Lys Phe Asp Asp Ala Leu Met Arg Pro

500

505

510

Met Phe Gly Gly Arg Gly Phe Val Pro Phe Ser Pro Gly Ser Pro Thr

515

520

525

Glu Gln Ser His Gly Gly Arg

530

535